US005583478A

United States Patent [19]

Renzi

[11] Patent Number: 5,583,478

[45] Date of Patent: Dec. 10, 1996

[54] **VIRTUAL ENVIRONMENT TACTILE SYSTEM**

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[21] Appl. No.: **397,291**

[22] Filed: **Mar. 1, 1995**

[51] **Int. Cl.**[6] **H04B 3/36**

[52] **U.S. Cl.** **340/407.1**; 341/20; 341/21; 341/27; 414/5; 73/865.7

[58] **Field of Search** 340/407.1, 407.2, 340/825.19, 965; 73/862.04, 865.7; 434/112, 113, 114, 115; 414/4, 5, 6, 7; 341/20, 21, 27

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[57] **ABSTRACT**

A method for providing a realistic sense of touch in virtual reality by means of programmable actuator assemblies is disclosed. Each tactile actuator assembly consists of a number of individual actuators whose movement is controlled by a computer and associated drive electronics. When an actuator is energized, the rare earth magnet and the associated contactor, incorporated within the actuator, are set in motion by the opposing electromagnetic field of a surrounding coil. The magnet pushes the contactor forward to contact the skin resulting in the sensation of touch. When the electromagnetic field is turned off, the rare earth magnet and the contactor return to their neutral positions due to the magnetic equilibrium caused by the interaction with the ferrous outer sleeve. The small size and flexible nature of the actuator assemblies permit incorporation into a glove, boot or body suit. The actuator has additional applications, such as, for example, as an accelerometer, an actuator for precisely controlled actuations or to simulate the sensation of braille letters.

15 Claims, 12 Drawing Sheets